Influence of manufacturing parameters on the electrochemical performance of high-energy cathodes for Li-ion batteries

Katja Fröhlich [a], Marcus Jahn [a], Corina Täubert [a]
[a] *Electric Drive Technologies, AIT Austrian Institute of Technology GmbH, Giefinggasse 2, 1210 Vienna, Austria*

E-mail: *katja.froehlich@ait.ac.at*

The performance of electrochemical energy storage devices is not only influenced by the choice of active material and its synthesis route [1], but also by electrode and cell design in manufacturing.

Still, little work has been published on the influence of industrial processing parameters on the electrochemical performance. Most studies focus on slurry preparation and resulting rheological data [2] [3], model-based evaluations [4] or are performed at laboratory scale which cannot be fully applied to commercial cells [5].

In this work, high-energy cathodes based on commercial $LiNi_{1/3}Mn_{1/3}Co_{1/3}O_2$ (NMC) were fabricated with varying several process parameters such as active material loading, calendering pressure and thermal treatment. Their interaction was studied for application tailored electrode design. For coating and calendaring, pilot facilities were used in order to meet industrial requirements for cell production. This was to ensure the process optimization can be implemented into an industrial setting.

The results show how these three parameters can optimize the energy density of the NMC-based cathodes while ensuring the desired electrochemical performance. The electrochemical results were correlated to the chosen parameters and statistically evaluated.

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References:
[1] K. Froehlich, E. Legotin, F. Baerhold, A. Trifonova, J. Solid State Electrochem. 27/12 (2017) 3403-3410.
[2] W. Bauer, D. Noetzel, Ceramics International 40 (2014) 4591-4598.
[3] K. Y. Cho, Y. I. Kwon, J. R. Youn, Y. S. Song, Materials Research Bulletin 48 (2013) 2922-2926.
[4] M. Doyle, Y. Fuentes J. Electrochem. Soc. 150/6 (2003) A706-A713.
[5] H. Y. Tran, G. Greco, C. Taeubert, M. Wohlfahrt-Mehrens, W. Haselrieder, J. Power Sources 210 (2012) 276-285.